FIG. 1

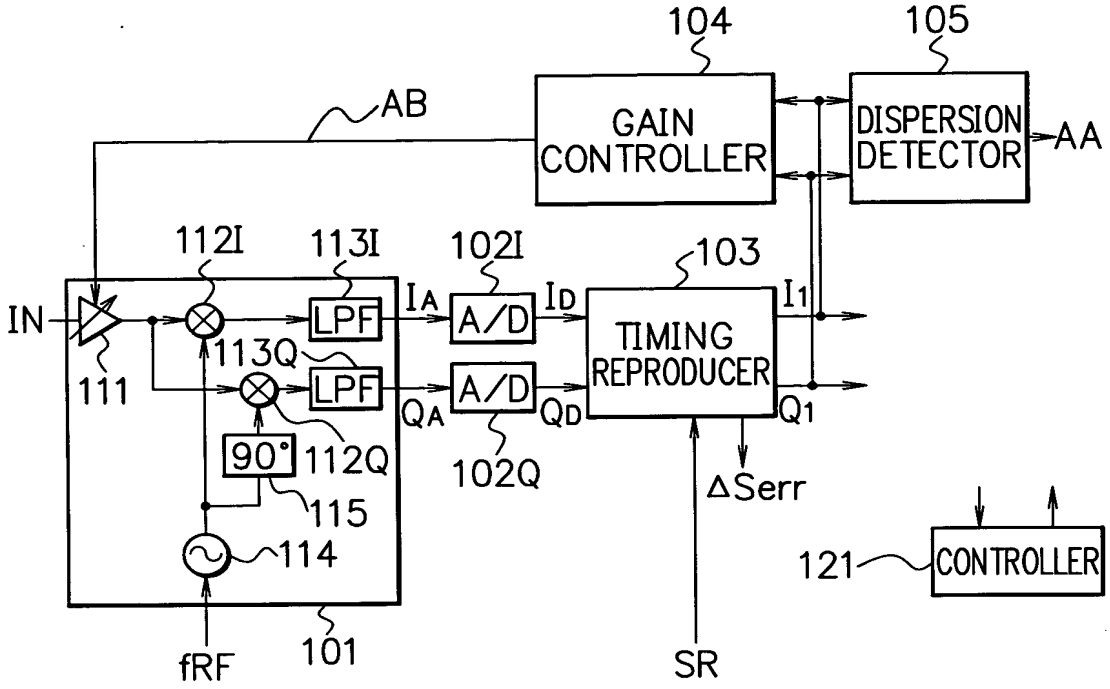

104
105
AB
GAIN CONTROLLER
DISPERSION DETECTOR
AA
112I
113I
102I
103
IN
111
LPF
113Q
LPF
IA
A/D
ID
TIMING REPRODUCER
I1
QA
A/D
QD
Q1
90°
112Q
102Q
115
ΔSerr
114
121
CONTROLLER
fRF
101
SR

FIG. 2

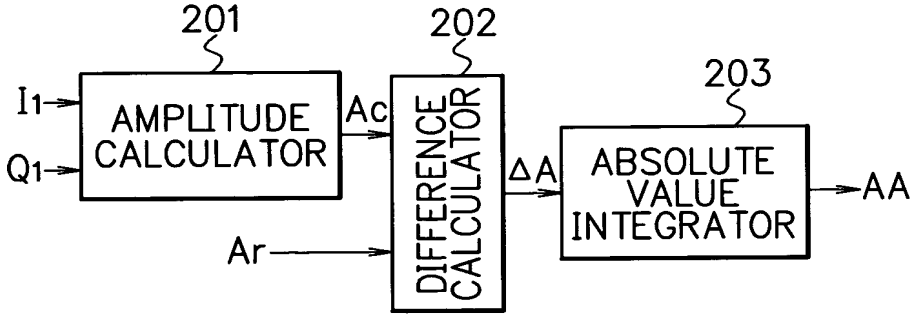

201
202
203
I1
AMPLITUDE CALCULATOR
Ac
DIFFERENCE CALCULATOR
ΔA
ABSOLUTE VALUE INTEGRATOR
AA
Q1
Ar

FIG. 3A

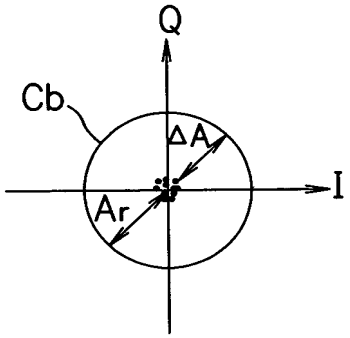


FIG. 3B

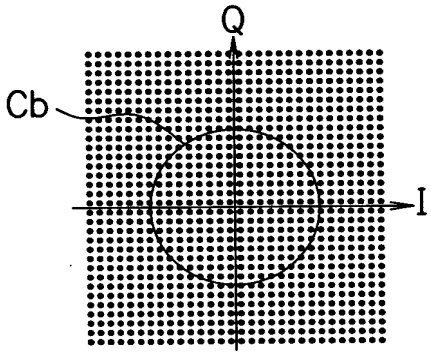


FIG. 3C

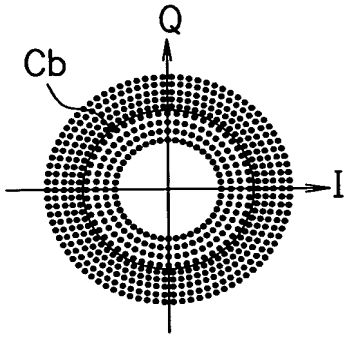


FIG. 3D

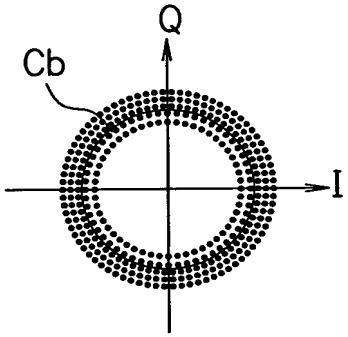


FIG. 4A

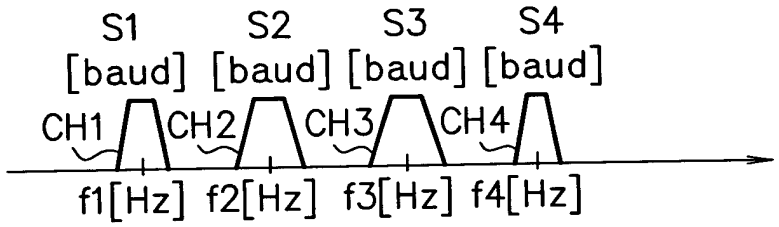


FIG. 4B

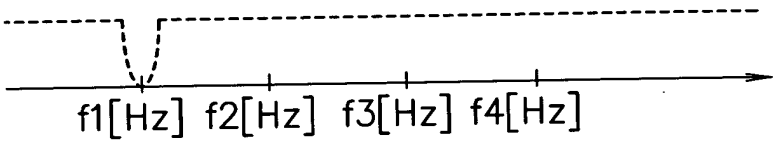


FIG. 4C

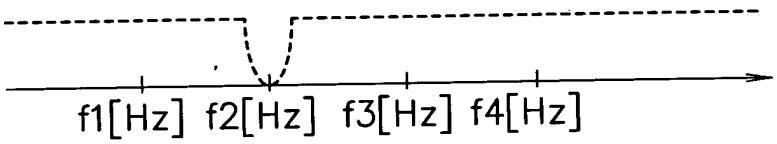


FIG. 4D

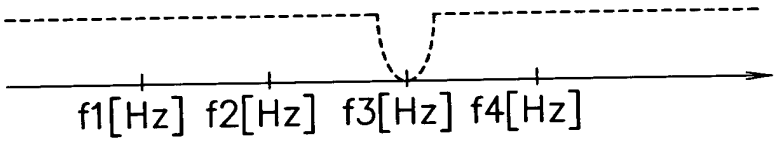


FIG. 4E

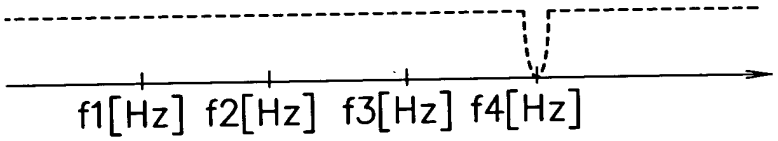


FIG. 4F

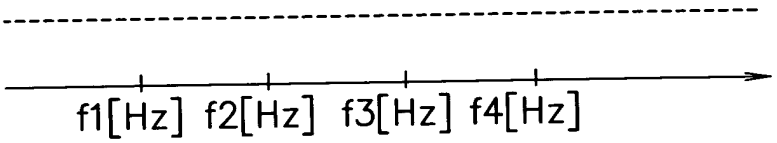
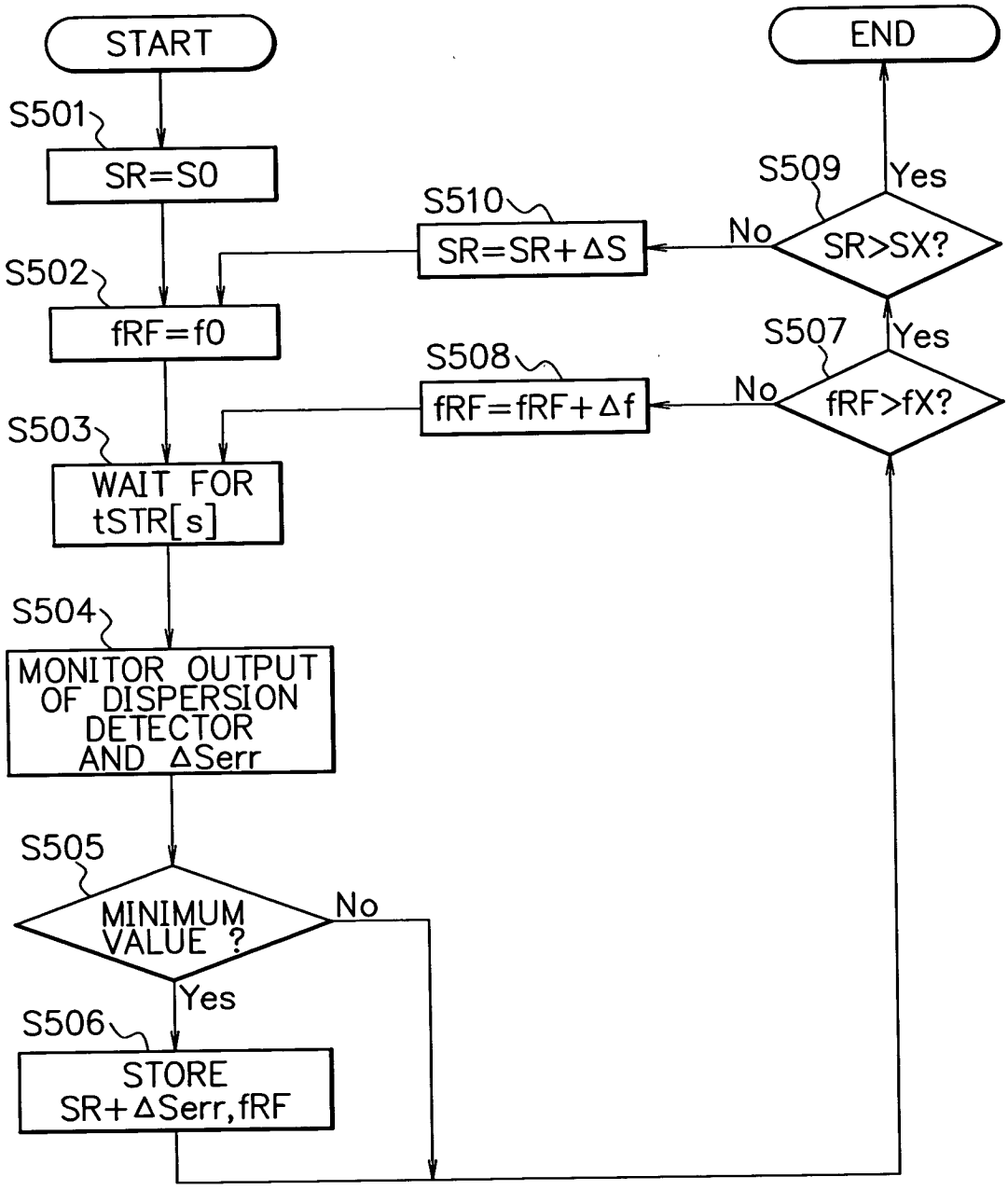


FIG. 5


START
S501
SR=S0
S502
fRF=f0
S503
WAIT FOR tSTR[s]
S504
MONITOR OUTPUT OF DISPERSION DETECTOR AND ΔSerr
S505
MINIMUM VALUE ?
No
Yes
S506
STORE SR+ΔSerr, fRF
S507
fRF>fX?
No
Yes
S508
fRF=fRF+Δf
S509
SR>SX?
No
Yes
S510
SR=SR+ΔS
END

F I G. 6

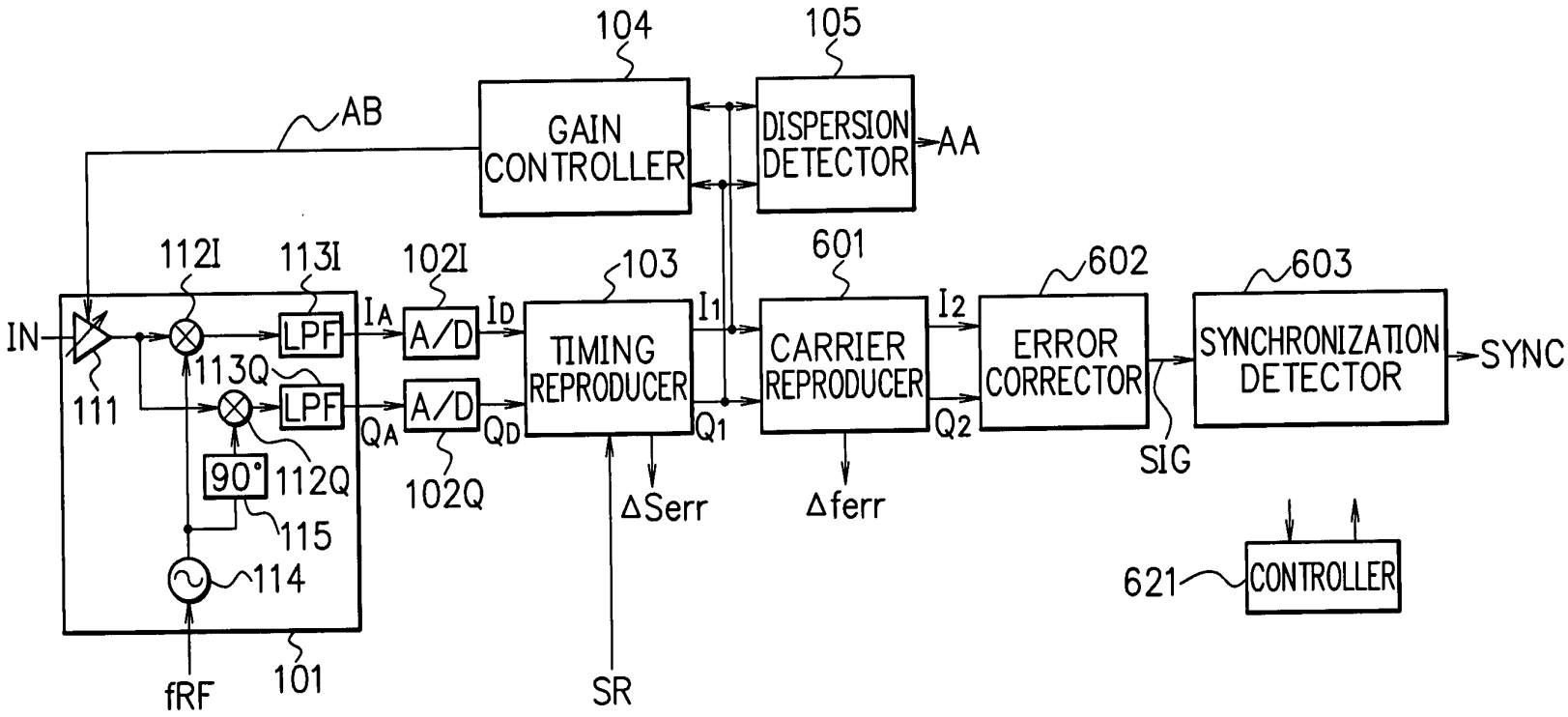

104
105
AB
GAIN CONTROLLER
DISPERSION DETECTOR
AA
112I
113I
102I
103
601
602
603
IN
LPF
A/D
I_A
I_D
TIMING REPRODUCER
I_1
CARRIER REPRODUCER
I_2
ERROR CORRECTOR
SYNCHRONIZATION DETECTOR
SYNC
111
113Q
LPF
A/D
Q_A
Q_D
Q_1
Q_2
90°
112Q
102Q
ΔSerr
Δferr
SIG
115
114
621
CONTROLLER
fRF
101
SR

FIG. 7

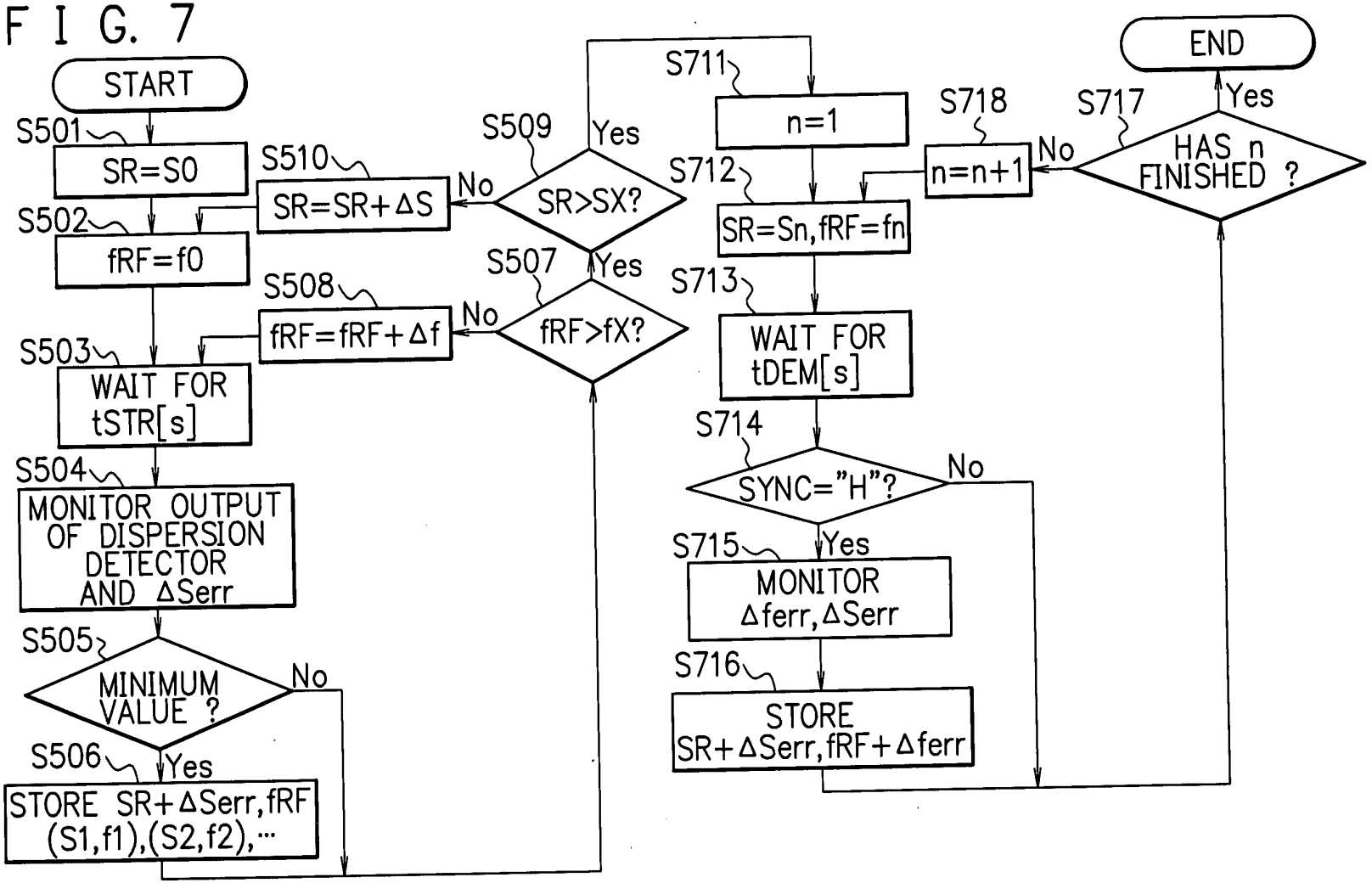

START
S501
SR=S0
S502
fRF=f0
S503
WAIT FOR tSTR[s]
S504
MONITOR OUTPUT OF DISPERSION DETECTOR AND ΔSerr
S505
MINIMUM VALUE ?
No
Yes
S506
STORE SR+ΔSerr,fRF (S1,f1),(S2,f2),…
S507
fRF>fX?
No
Yes
S508
fRF=fRF+Δf
S509
SR>SX?
No
Yes
S510
SR=SR+ΔS
S711
n=1
S712
SR=Sn,fRF=fn
S713
WAIT FOR tDEM[s]
S714
SYNC="H"?
No
Yes
S715
MONITOR Δferr,ΔSerr
S716
STORE SR+ΔSerr,fRF+Δferr
S717
HAS n FINISHED ?
Yes
No
S718
n=n+1
END

FIG. 8

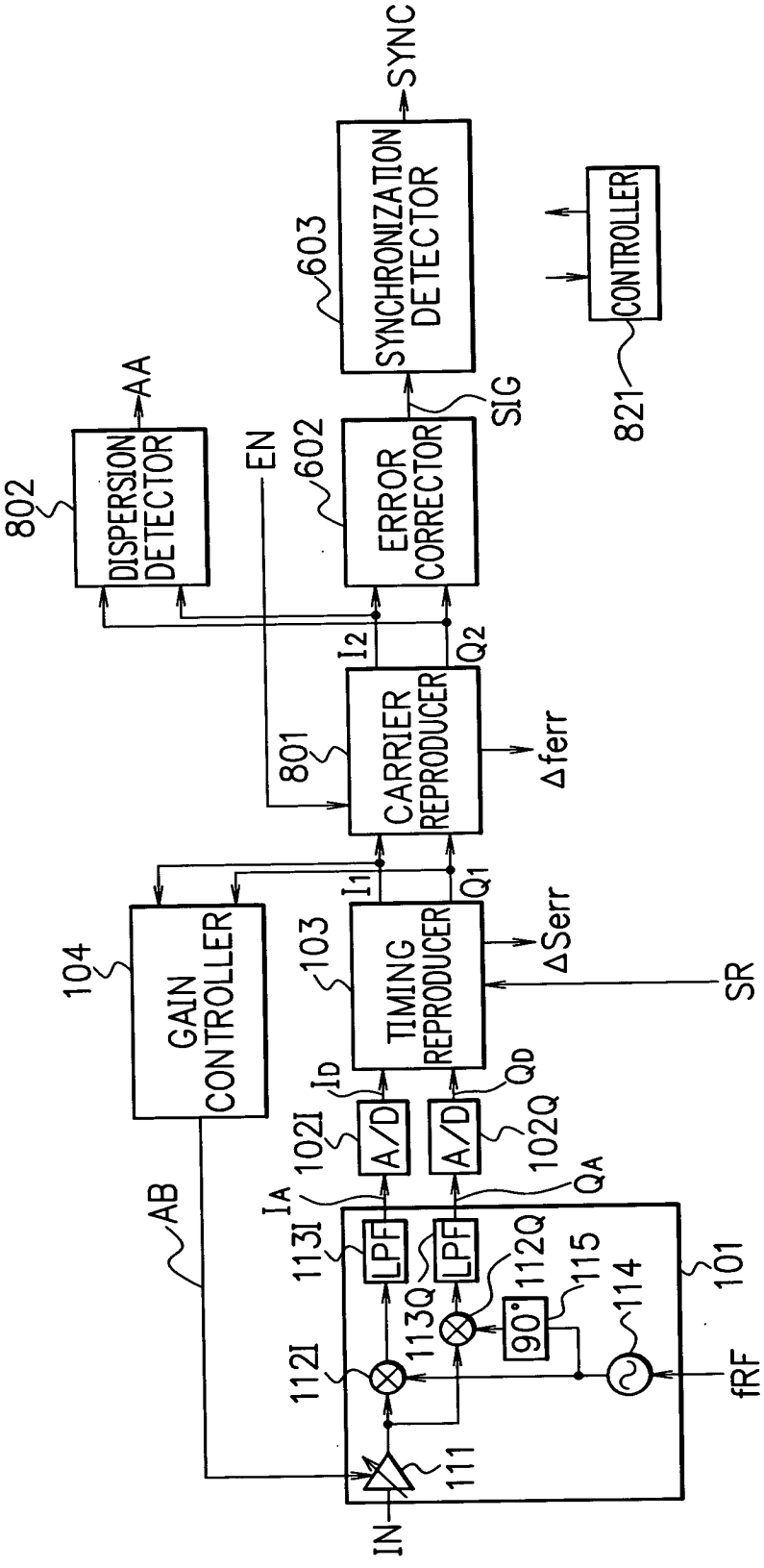

IN
111
112I
113I
113Q
112Q
LPF
LPF
90°
115
114
fRF
101
AB
IA
QA
102I
102Q
A/D
A/D
ID
QD
103
TIMING REPRODUCER
ΔSerr
SR
104
GAIN CONTROLLER
I1
Q1
801
CARRIER REPRODUCER
Δferr
I2
Q2
EN
802
DISPERSION DETECTOR
AA
602
ERROR CORRECTOR
SIG
603
SYNCHRONIZATION DETECTOR
SYNC
821
CONTROLLER

FIG. 9

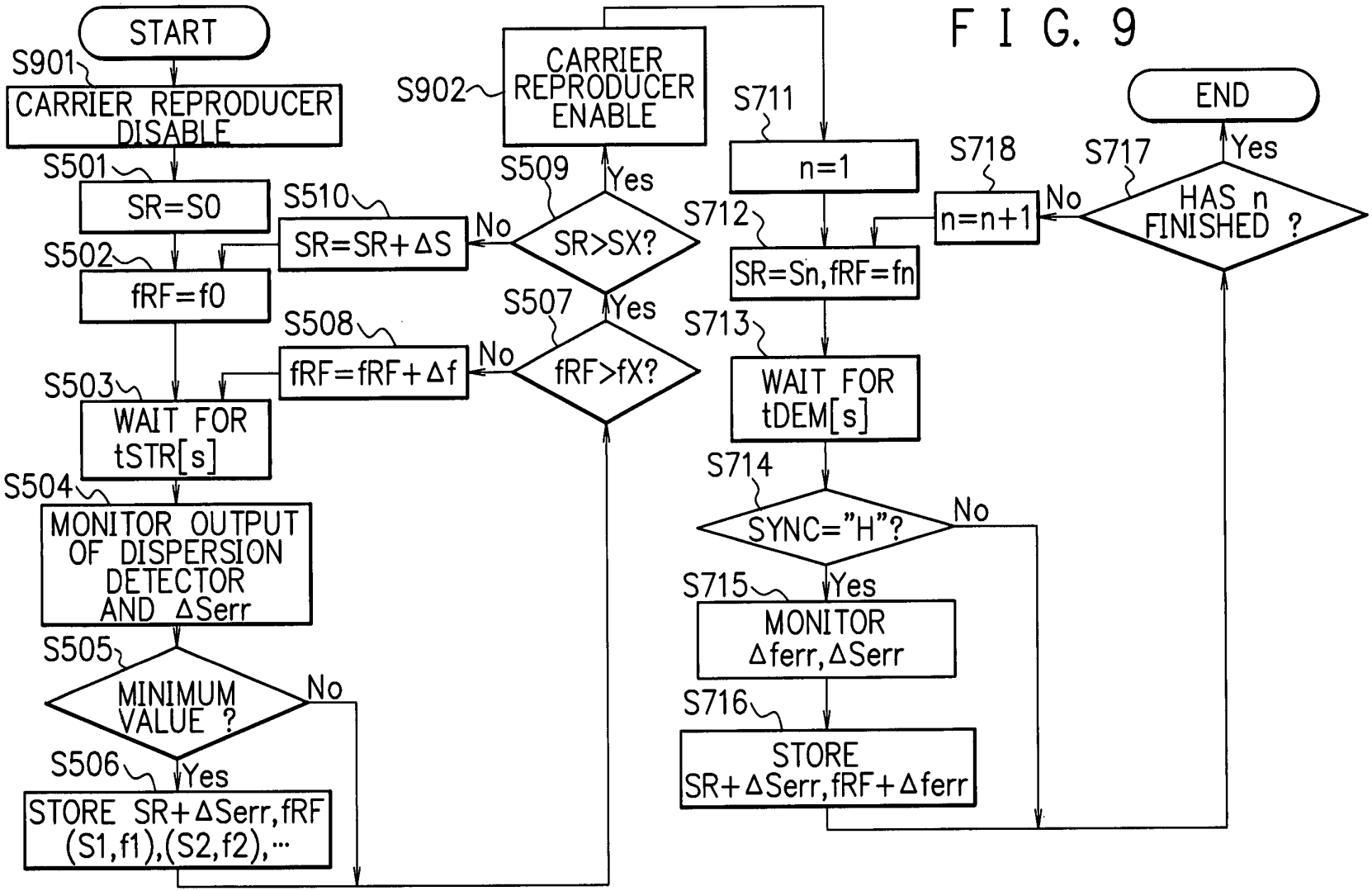

START
S901
CARRIER REPRODUCER DISABLE
S501
SR=S0
S502
fRF=f0
S503
WAIT FOR tSTR[s]
S504
MONITOR OUTPUT OF DISPERSION DETECTOR AND ΔSerr
S505
MINIMUM VALUE ?
No
Yes
S506
STORE SR+ΔSerr,fRF (S1,f1),(S2,f2),…
S902
CARRIER REPRODUCER ENABLE
S509
Yes
SR>SX?
No
S510
SR=SR+ΔS
S507
Yes
fRF>fX?
No
S508
fRF=fRF+Δf
S711
n=1
S712
SR=Sn,fRF=fn
S713
WAIT FOR tDEM[s]
S714
SYNC="H"?
No
Yes
S715
MONITOR Δferr,ΔSerr
S716
STORE SR+ΔSerr,fRF+Δferr
S718
n=n+1
No
S717
HAS n FINISHED ?
Yes
END

FIG. 10A

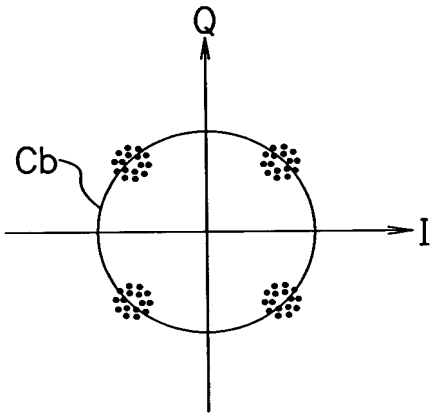
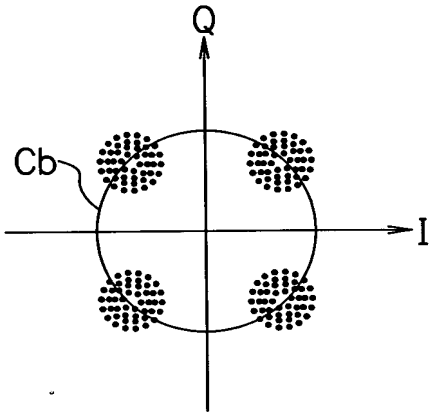


FIG. 10B



F I G. 11

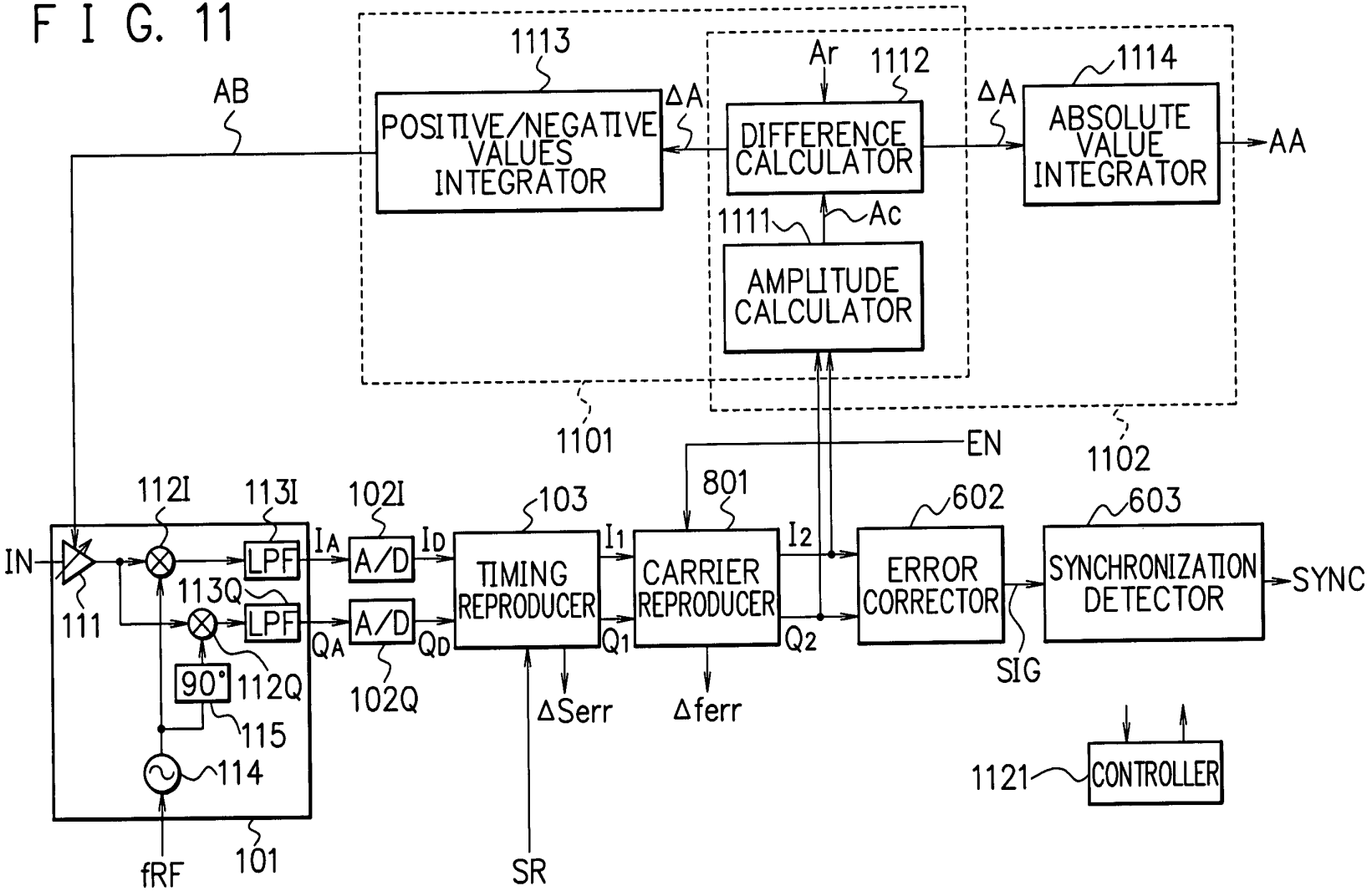

1113
AB
POSITIVE/NEGATIVE VALUES INTEGRATOR
ΔA
Ar
1112
DIFFERENCE CALCULATOR
ΔA
1114
ABSOLUTE VALUE INTEGRATOR
AA
1111
Ac
AMPLITUDE CALCULATOR
1101
1102
EN
801
603
602
112I
113I
102I
103
IN
111
LPF
IA
A/D
ID
TIMING REPRODUCER
I1
CARRIER REPRODUCER
I2
ERROR CORRECTOR
SYNCHRONIZATION DETECTOR
SYNC
113Q
LPF
A/D
QA
QD
Q1
Q2
SIG
90°
112Q
102Q
115
ΔSerr
Δferr
114
1121
CONTROLLER
fRF
101
SR

FIG. 12

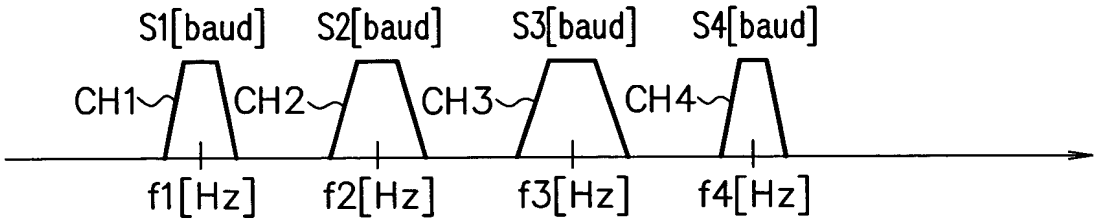


FIG. 13

CHANNEL	1	2	3	4
CARRIER FREQUENCY SET VALUE [Hz]	f1	f2	f3	f4
SYMBOL RATE SET VALUE [Baud]	S1	S2	S3	S4

FIG. 14 PRIOR ART

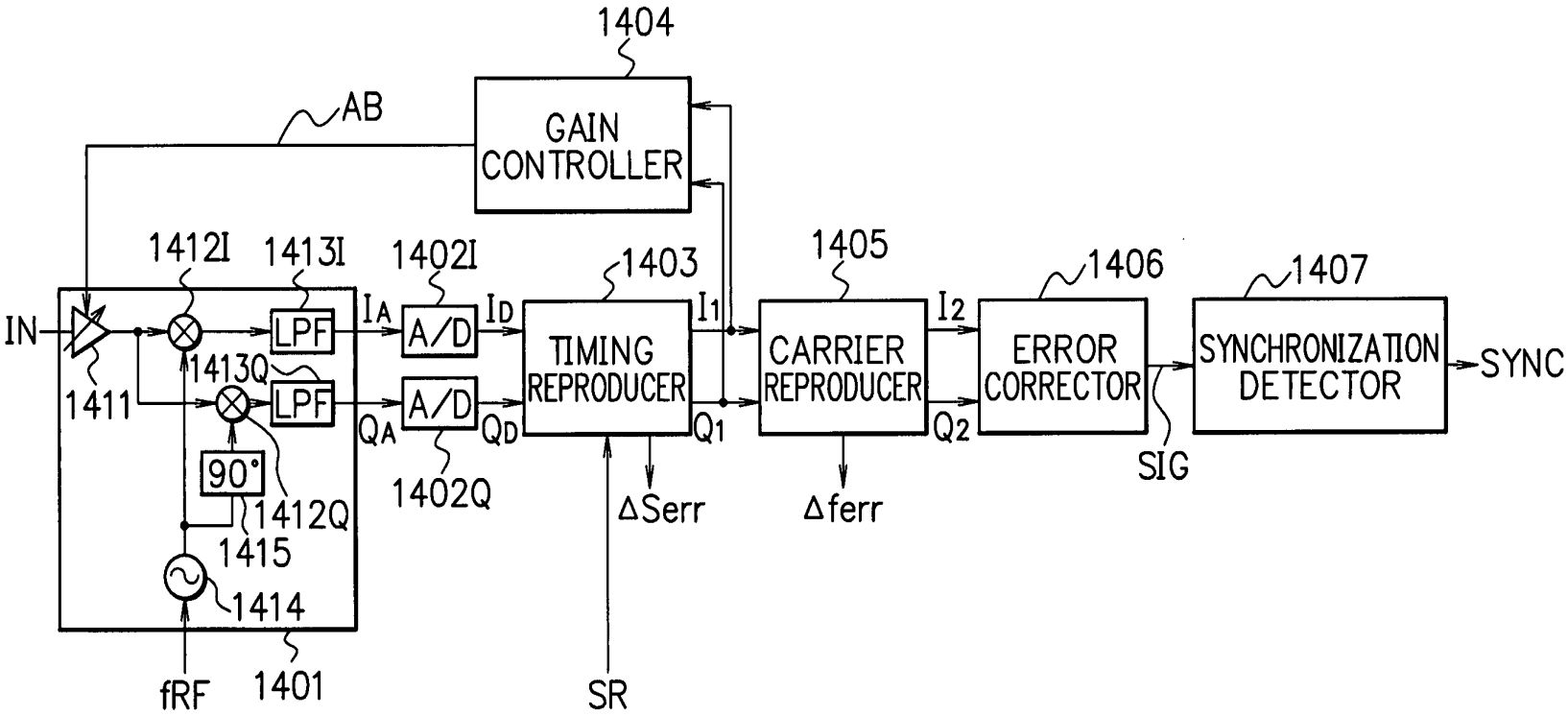


FIG. 15A

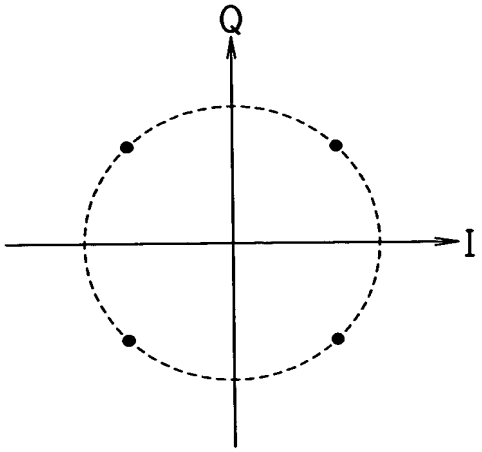


FIG. 15B

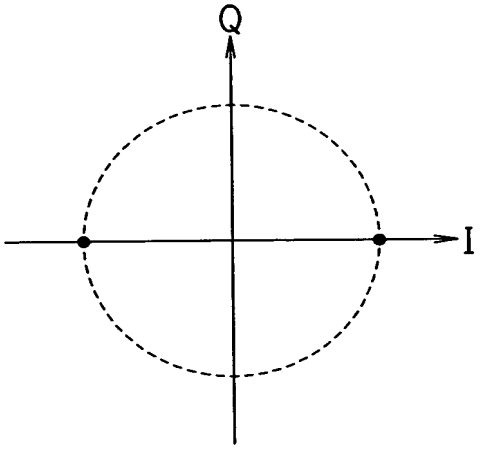


FIG. 15C

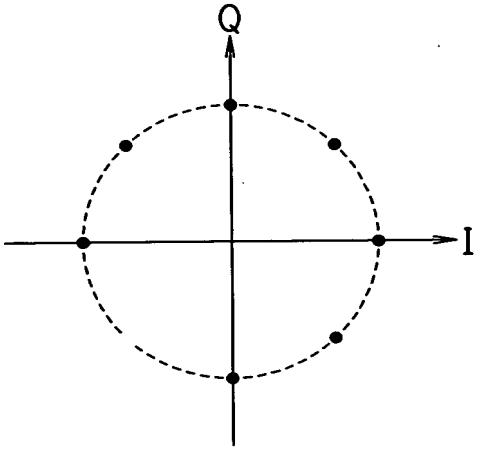
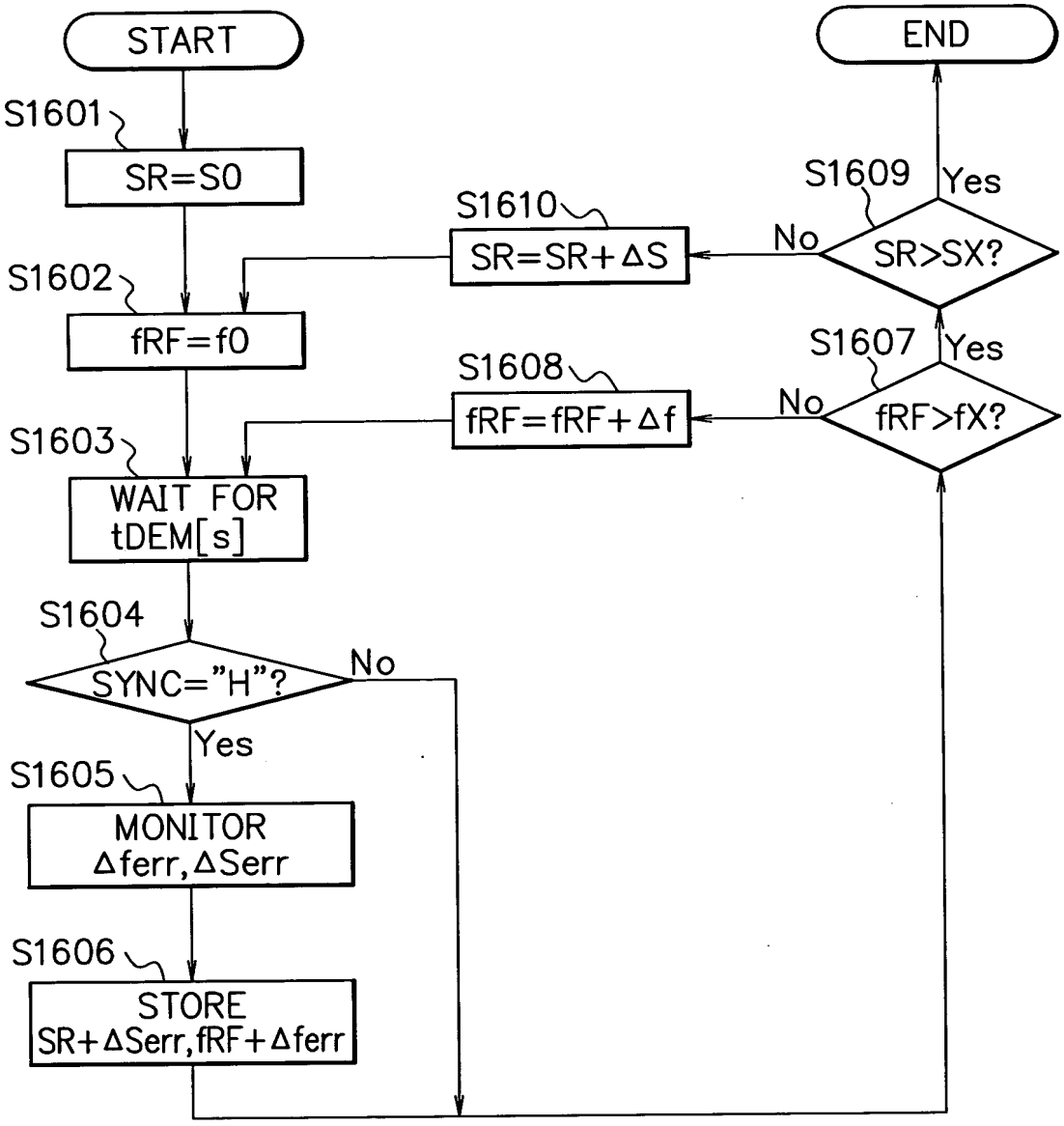



FIG. 16 PRIOR ART